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INFORMATION SYSTEMS: THE FOURTH OPERATIONAL FACTOR
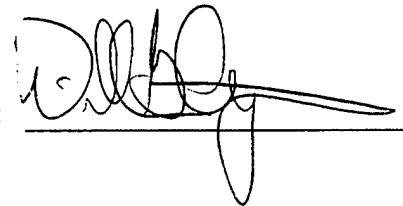

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A paper submitted to the Faculty of the Naval War College in
partial satisfaction of the requirements of the Department of
Joint Military Operations.

The contents of this paper represent my own personal views and
are not necessarily endorsed by the Naval War College or the
Department of the Navy.

Signature: _____

5 February 2001

Professor Paul Romanski
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REPORT DOCUMENTATION PAGE

1. Report Security Classification: UNCLASSIFIED

2. Security Classification Authority:

3. Declassification/Downgrading Schedule:

4. Distribution/Availability of Report: DISTRIBUTION STATEMENT A: APPROVED FOR PUBLIC RELEASE; DISTRIBUTION IS UNLIMITED.

5. Name of Performing Organization: JOINT MILITARY OPERATIONS DEPARTMENT

6. Office Symbol: C

7. Address: NAVAL WAR COLLEGE
686 CUSHING ROAD
NEWPORT, RI 02841-1207

8. Title (Include Security Classification): UNCLASSIFIED
Information Systems: The Fourth Operational Factor (U)

9. Personal Authors: William G. Apigian, Major, U.S. Army

10. Type of Report: FINAL

11. Date of Report: 5 February 2001

12. Page Count: 24

13. Supplementary Notation: A paper submitted to the Faculty of the NWC in partial satisfaction of the requirements of the JMO Department. The contents of this paper reflect my own personal views and are not necessarily endorsed by the NWC or the Department of the Navy.

14. Ten key words that relate to your paper:

15. Abstract:

16. Distribution / Availability of Abstract:	Unclassified X	Same As Rpt	DTIC Users

17. Abstract Security Classification: UNCLASSIFIED

18. Name of Responsible Individual: CHAIRMAN, JOINT MILITARY OPERATIONS DEPARTMENT

19. Telephone: 841-6461

20. Office Symbol: C

Abstract

INFORMATION SYSTEMS: THE FOURTH OPERATIONAL FACTOR

Operational art applies the factors of space, time and force to link strategy and tactics. Today's technologically sophisticated battlefield mandates the need for a fourth operational factor—information systems.

Two criticisms of Operation ALLIED FORCE were that information operations were not part of the initial plan and that information systems were relied upon too heavily as the operation unfolded.

The inclusion of information systems as an operational factor in future conflicts, will ensure the function is not overlooked by operational planners and that its use is balanced among other elements of power at the strategic and tactical levels.

Now the elements of the art of war are first, measurement of space; second, estimation of quantities; third, calculations; fourth comparisons; and fifth, chances of victory.[1]

- Sun Tzu

It has been well over 2,000 years since Sun Tzu clearly expressed the fundamental importance of information when planning for, or conducting, war. Ever since these writings were first published—if not even before—information has been overwhelmingly documented as an integral part of fighting and winning wars. Some authors do attempt to trivialize the effect information has on war, though. They cite the ever present "fog of war," but these scholars quote Clausewitz like a child playing with a gun—it is never used for the intended purpose, and those around often get hurt.[2]

This study will not applaud the decision to lead the military down the expensive road toward information dominance, nor will it side with the small but vocal minority who call the idea foolish and dismiss the value of information superiority.[3] It will focus attention on what appears to be an overlooked issue, the role of information systems as they relate to military operations.

If information systems are accepted as the fourth operational factor alongside the accepted trio of space, time and force[4], then operational planners will be better situated to unleash the awesome powers current information technologies

harness to meet national objectives and support tactical

engagements. Proving this thesis requires an agreement of

what information and information systems are, and what they

are not. One must work up from this foundation and around the

operational level of war to define the role of information

systems at both the strategic and tactical levels.[5] At this

point one can finally discuss information systems as an

operational factor and draw conclusions as to their role in

the important, but ambiguous field of operational art.[6]

Information Systems: What are they?

> *Data collected from the environment and processed
> into a usable form.*[7]

>> - Information as defined by FM
>>   100-6 Information Operations

Like the multitude of other definitions on what

information is this definition has three essential parts:

data, process, and form. Data is the object, processing is

the action taken on the object, and form is the final output.

The final output of information is something visible or

audible to the intended audience.

However, information is not knowledge, or as it is called

in the military, intelligence. Knowledge is the dynamic mix

of information in context, experience, insight, and values.[8]

Knowledge comes from multiple information inputs on the senses

to provide an answer.

An information system is the entire infrastructure—to include personnel and components—that collect, process, store, transmit, display, disseminate, and act on information.[9] The human body is an information system at the most simplistic level. It collects data pieces from our various senses, processes them into information, and disseminates it as required. At the most complex level, the global information system encompasses all humans and devices that deal with information.

A global information system has existed ever since man first traversed the world. Today, technology increases the number of active components on the system, reduces the transmission time and increases reliance on current information when making decisions. Leaders used to make decisions based on what information was available and knowledge. Information was accepted as a finite resource. Today the inverse holds true. In purely military terms, leaders today consistently demand more information and less intelligence.[10] Information systems are a function we can no longer live without.

Information and Strategy

The strategic level is where a nation determines its national objectives, and develops and uses national resources to accomplish these objectives.[11] Four instruments of national

power exist: diplomatic, economic, informational, and military. It would seem quite logical to assume that the Secretary of State wields the diplomatic stick, the Secretary of Defense carries the military muscle and so on, but the duty lines are not quite this clear.

Elements of national power rest as part of a strategic arsenal that can be leveraged by any member of a nations' leadership team with authorized, or unfortunately in some cases unauthorized, access to them. For example, U.S. Combatant Commanders (CINCs) are more often diplomats than warfighters and ambassadors are businessmen not statesmen when they leverage economic power to efficiently and positively support national objectives.

Information, in the context of its role as an instrument of power, provides not just an access and use capability within the global information environment, but also denies such access and use to others. Information's place as one of four elements of power is evidence of its strategic criticality. Any plan delineating the use of information assets to satisfy national objectives must be continually reviewed and assessed.

Melding the Elements of Power: A Military/Information Example

Though the four elements of national power are focused to satisfy strategic objectives, each can be leveraged

independently to achieve results. However, they are strongest
when working in unison, designing coherent strategy that
eliminates diametrically opposed operations. This is
particularly important when a nation wages war.

A nation declares war alone or as part of a coalition to
achieve specific national objectives. Utilizing the military
as the supported element of national power usually means that
the other three elements cannot or failed to achieve the
desired results as the supported power. As the supported
power, the military cannot disregard the other elements of
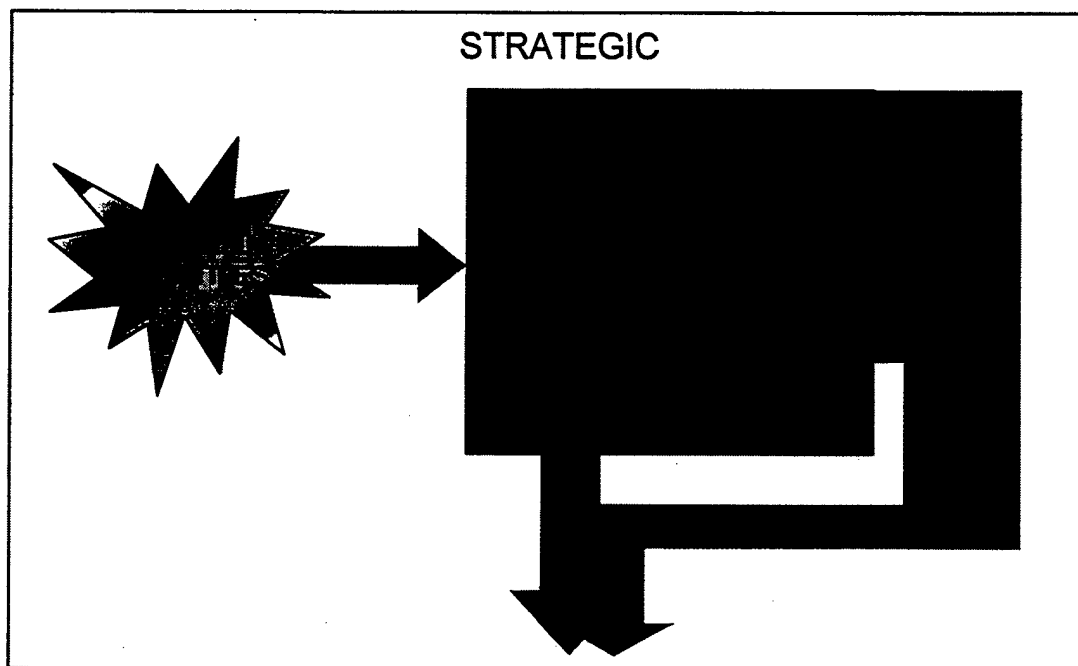national power.

Figure (1)

Figure (1) depicts how national objectives "challenge"
the elements of national power to take action.

In this instance, the military, as the "supported power," devises a plan to determine the best use of available means to achieve objectives. The other three "supporting elements of power" work concurrent plans to meet the same objectives. These supporting plans provide baseline "constraints and restraints," which in conjunction with the military objectives issued, are used to shape military plans at the next level.

For example, the information plan at the strategic level might discuss the need to maintain an adversary's ability to communicate with third party nations open. This would restrain military planners from possibly denying the adversary access to communications satellites.

Not all constraints and restraints issued may limit missions for the military to execute. Some may actually dictate missions. For example, if planners determine it is advantageous to disrupt a leaders' ability to freely communicate with the general public, attacks on communications towers may be dictated. The constraint here is based on the informational element of power executing a mission or issuing the order to the military that may interfere with the general military plan conceived at the strategic level.

Information and Tactics

War, at the tactical level, is all about fighting and winning battles and a battle is not won without information.

Battles and engagements are planned and executed to accomplish tactical military objectives.[12] These battles and engagements apply four elements of combat power to achieve success: maneuver, firepower, protection, and leadership.

Though information is considered an instrument of power at the strategic level, it is defined and implemented at the tactical level in two of the seven combat functions[13] that support combat power. These functions, intelligence and battle command, are influenced by the military's increasing reliance on information and information systems.

This has resulted in tacticians routinely incorrectly using intelligence and information as synonymous terms. Army Field Manual 100-5, Operations, describes the intelligence function as gathering and analyzing information on the environment of operations and the enemy.[14] The manual never discusses synthesizing information to provide the commander with predictions.

The delineation 100-5 makes between information and intelligence as a combat function is that intelligence should be tailored information that is clear, brief, relevant, and timely (the omission of accuracy was likely an oversight vice an intention).[15] This emphasis on information collection rather than intelligence analysis might justify the renaming

of the intelligence directorates in the services to information directorates.[16]

Battle command has been influenced in a different manner by information. Battle command is described as the art of decision making and leading, but weaved throughout the description are elements of effective communication systems and information sharing. Battle command seeks to ensure the commander can break from the headquarters and move to the action, yet still maintain an accurate picture of the entire operation. Instantaneous communications are critical for the commander to receive information and pass it on with guidance and instructions.

Diagramming the Tactical Level of War

Figure (2) illustrates how missions received at the tactical level are planned to achieve tactical objectives. Multiple missions are issued to tactical units in the form of orders. Under the direction of their commander, a staff determines the best utilization of available combat power to exploit enemy weaknesses. Once this is determined, the seven combat functions are integrated into the battle plan. Directly linking accurate intelligence and successful battle command to information suggests a units' achievement of tactical objectives is critically dependent upon its ability to use information and information systems and deny this use
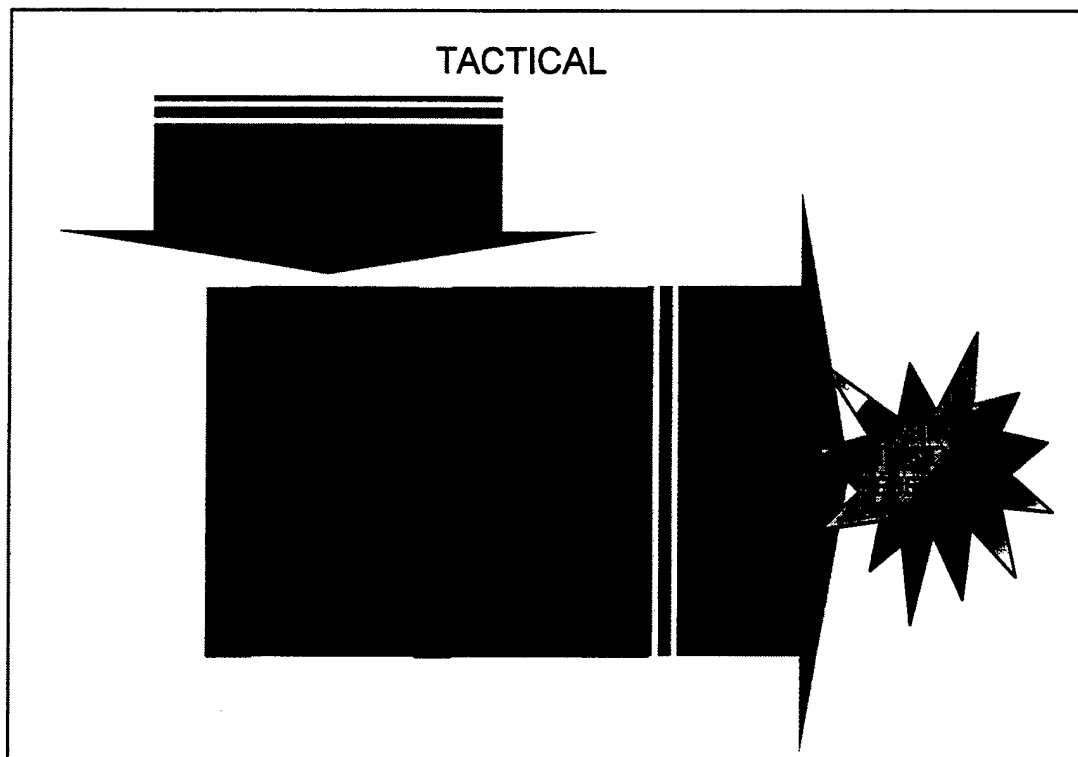
TACTICAL

Figure (2)

to the enemy. Further, if a battle cannot be won without
information, it can then be said intelligence and battle
command are the lynchpins to victory. Thus, information and
information systems are equally important to achieving
tactical objectives as they are to accomplishing national
objectives at the strategic level.

Information and Operational Art

Whereas national power is directed to achieve objectives
at the strategic level and combat power is levied to
accomplish tactical objectives at the tactical level,

operational factors are the power employed at the operational level.

It is interesting to note that the glossary of *FM 100-5 Operations* provides a definition of strategy and tactics similar to the ones above, yet omits a specific definition of operations, choosing to define operational art instead. This is likely because the definition would read that operations are the art of applying operational art to link tactics and strategy.

Operational art is the employment of military forces to attain strategic and/or operational objectives through the design, organization, integration, and conduct of strategies, campaigns, major operations and battles. It translates strategy into operational design and ultimately into tactical action by integrating activities at all levels of war.[17] This is not the only definition of operational art, but it highlights the important role operational art plays in linking strategy to tactics.[18]

The factors of operational art are those elements critical to ensuring freedom of action or the ability to maintain multiple options to reach an assigned military objective.[19] These factors constitute the elements of power given to an operational commander.

There are three accepted operational factors: space, time and force. It is argued that freedom to act across these three factors places a commander at a marked advantage over his opponent. Technology has changed the battlefield dynamic drastically and a commander is hamstrung without communications to shoot, move, and lead. Space, time, and force no longer stand-alone; the information systems dimension must be added. Without information systems, 25% of national power and 28% of combat power is lost.[20]

Illustrating Information as an Operational Factor

The most prominent example of an information systems influence on military operations is the media. The approach the military takes in its interaction with the media can have dramatic impact on attitudes of the public in both friendly and hostile nations toward an operation. Television, radio and the Internet must all be considerations in planning operations. Few forget the military's savvy use of the media during Operation DESERT STORM, not just to bring the conflict to America's living room but also to mislead Saddam Hussein by leaking false tactical maneuvers to the press.

Within the military information environment another example is found. Target analysis of enemy command and control provides commanders with options to deny enemy access to intelligence and battle command by degrading critical

command and control nodes; the result is a marked operational advantage. If communication degradation is not selected, a commander can still intercept enemy communications and achieve a measure of success. It goes without saying that protecting ones own information systems against exploitation is equally important.

A third example is found in the national information infrastructure. Consider military actions to degrade or disable electric power, landline communications, and the flow of arms or war supplies throughout a country. Information is critical in determining which networks are dual use and which remain civilian controlled. Subsequent information provides an estimated impact these actions will have on non-combatants, and eventually the countries ability for post-war rebuilding. During allied bombings against Serbia, approximately 20% of military communications were passed over the civilian communications network.[21]

Finally, the global information infrastructure must be considered. The last ten years have been marked by rapid globalization, resulting in widespread interdependence, mostly along economic lines. Any operational objective, which considers denying enemy access to the global information infrastructure, fails to account for the impact this would have on the enemy's global partners.

In essence, operational commanders must assess all these

elements of the information systems factor to determine what

assets to destroy to limit an enemy's effectiveness, what

assets to maintain to support collection activities, what

friendly assets are vulnerable to attack and what assets

affect non-combatants. Conclusions must be drawn prior to

assigning missions to tactical commanders for execution.

Linking Tactics to Strategy

Some argue that information is the link between space,

time and force and should not be considered as an operational

factor.[22] The link is knowledge, not information. The

integration of space, time, force and information systems

provides clues to a problem. The knowledge of friendly

operations and intelligence on enemy operations brings these

clues together and offers a solution.

On the battlefield, a commander uses his knowledge to

link time and location of an operation to the appropriate

force ratio. Intelligence officers should provide the same

application when recommending likely enemy courses of action.

Information systems are an additional factor involved in the

assessment, not the link holding an assessment together.

Figure (3) reflects the integration of operational art to

the strategic and tactical objectives. National objectives

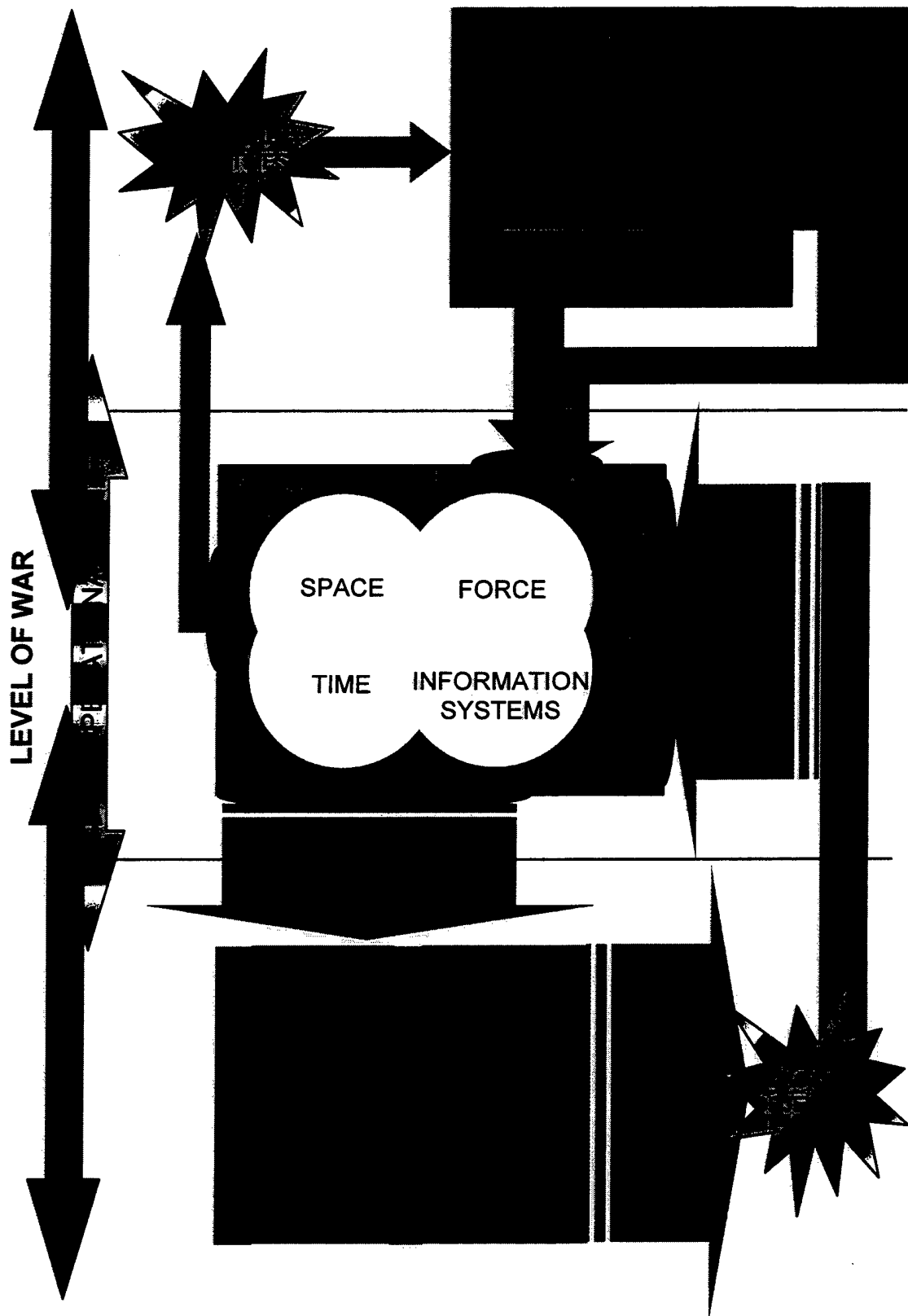result in the military element of national power developing a

LEVEL OF WAR

SPACE FORCE

TIME INFORMATION SYSTEMS

Figure (3)

14

strategic mission. This mission is analyzed and dissected

according to the four operational factors and specific

tactical missions are subsequently assigned to units. These

tactical missions are planned, battles and engagements are

fought, and tactical objectives are achieved. Tactical

objectives are then arranged and analyzed at the operational

level to meet operational objectives that should, in

conjunction with the actions of the other elements of national

power, meet the requirements spelled out in the national

objectives.

Information Systems, Operational Factors and Kosovo

Operation ALLIED FORCE received an inordinate amount of

press for its supposed information failures. Allegations

included, the U.S. relied too heavily on information systems,

there were too few high-value, low-density assets available,

the planners were not proficient in information operations,

commanders demanded total information superiority, and

information was expected to win the war alone. These comments

were drawn from multiple "after action" articles looking to

criticize military planners for foregoing the lessons of

operational art in favor of the glitz of information

technology.[23]

With classic bureaucratic flair, all reports detailed the problems, but few provided a solution for properly implementing information technology. Instead, they charged leaders to remember the lessons of past conflicts. While these lessons are worthwhile to remember, they don't address the more critical issue – how to move forward into the 21st century. A more useful critique would have advised on how to harness new technologies to ensure conventional warfare maintains pace with globalization.

Admiral Ellis, the JTF Commander for ALLIED FORCE, offered the best critique when he called for future operations to have information plans integrated into the overall strategy at the early stages of planning.[24] The assertions made in this study guarantee early integration of information plans if commanders consider information systems as an operational factor. At the outset, planners will be forced to focus not just on enemy force and terrain as key objectives, but the information infrastructure that supports them as well.

If information systems were considered an operational factor in Kosovo, several planning mistakes may have been avoided. First, NATO would likely have directed greater attention to public information statements to ensure they out-maneuvered Slobodan Milosevic in the war of public opinion, had the relationship between time and information been

considered. Second, after considering the relationship between information and space, low-density, high-demand assets would have likely conducted specific missions, not the wide array of missions assigned.[25] Finally, statements eliminating the ground force option would likely have been considered counter-productive after studying the relationship between force and information.

A Final Thought

There are many similar correlations between the debate that rages today over the increasing reliance on information systems to fight wars and the debates that occurred in the 1980's when the Army abandoned the concept of active defense in favor of "AirLand Battle."[26] In 1982 the Army pulled itself from the narrow focus of tactical operations and embraced, albeit begrudgingly by many, the theory that leveraging the power of joint forces through operational planning was the only way to meet strategic objectives.

Twenty years later, joint warfighters must be pulled from the narrow focus of joint combat operations and forced to embrace, if begrudgingly, the theory that leveraging the power of information operations in conjunction with combat operations is the only way to achieve strategic objectives. Accepting information systems as the fourth operational factor should be a big step in this direction.

NOTES

1 Sun Tzu, *The Art of War*, translated by Samuel B. Griffith, Oxford University Press, 1971, p. 88.

2 Clausewitz never dismissed the importance of information in warfare and his work is often misrepresented. An Internet search of "fog of war" came up with over 13,000 "hits." See Timothy L. Thomas, "Kosovo and the Current Myth of Information Superiority," *Parameters*, Vol. XXX, No. 1 (Spring 2000), p. 23, for one such example.

3 Timothy L. Thomas, "Kosovo and the Current Myth of Information Superiority," *Parameters*, Vol. XXX, No. 1 (Spring 2000), p. 27.

4 Milan Vego, *On Operational Art (4th Draft)*, United States Naval War College, 1999, pp. 53-54.

5 Clayton R. Newell, and Michael D. Krause, eds., *On Operational Art*, U.S. Government Printing Office, 1994, p. 33.

6 Scholars could argue this point considerably and it is not the objective of this paper to attempt that. I merely offer as evidence the current curriculum of the Naval War College as evidence. Two of three semesters focus primarily on the strategic levels of war and the one semester dedicated to joint military operations must split time between all three levels of war to accomplish the course objectives.

7 U.S. Army, *FM 100-6 Information Operations*, Department of the Army, 1999, p. G-7.

8 Clinton C. Brooks, "Knowledge Management and the Intelligence Community," *Defense Intelligence Journal*, 9-1 (Winter 2000), p. 16.

9 Joint Staff, *Joint Pub 3-13 Joint Doctrine for Information Operation*, Joint Staff, 1998, p. GL-7.

10 Vincent J. Goulding, "From Chancellorsville to Kosovo, Forgetting the Art of War," *Parameters*, Vol. XXX, No. 2 (Summer 2000), p. 5.

11 Joint Staff, *Joint Pub 3-0 Doctrine for Joint Operations*, Joint Staff, 1995, p. GL-5.

12 Ibid, p. GL-12.

13 The entire list of combat functions are: intelligence, maneuver, fire support, air defense, mobility and survivability, logistics, and battle command. These functions are also termed as battlefield operating systems with the exception of battle command which is replaced by combat service support.

14 U.S. Army, *FM 100-3 Operations*, Department of the Army, 1993, p. 2-12.

15 Ibid, p. 2-12.

16 The focus of this paper does not allow a further discussion on this topic, but the question of whether intelligence professionals today actually conduct analysis or simply weed through information and report relevant facts is worthy of research. In the past debate raged over the possibility of combining the communications and intelligence branches within the Army. Maybe this topic should be revisited.

17 Joint Staff, *Joint Pub 3-0 Doctrine for Joint Operations*, p. GL-10.

18 Milan Vego, *On Operational Art*, Naval War College Press, 1999, p.5.

19 Ibid, p. 53.

[20] While rather simplistic, if the argument that information systems constitute the factors of intelligence and battle command at the tactical level, then losing information systems reduces each of your elements of combat power by 28%.

[21] Thomas, p. 15.

[22] Vego, p. 53.

[23] Goulding, p. 6.

[24] Elaine Grossman, "U.S. Commander in Kosovo Sees Low-tech Threats to Hightech Warfare," *Inside the Pentagon*, Vol. 9, September 1999, p. 5.

[25] Robert P. Haffa, and Barry D Watts, "Brittle Swords: Low-density, High-demand Assets," *Strategic Review*, Vol. XXVIII, No. 4 (Fall 2000), p. 42.

[26] Newell, p. 14.

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